

THE KEVO SUBARCTIC
RESEARCH INSTITUTE
of the University of Turku

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POLARPAM

The Kevo Subarctic Research Institute^x of the University of Turku was established in 1956 to act as a centre for northern research, especially in biology and geography. Its main goals are

--- to take advantage of the fact that Finland extends to the subarctic zone, where the adaptation of the ecosystem to the north can be studied, in other words, adaptation to low temperature, short growth periods and particular light conditions.

--- to serve as a centre for "mapping" the distribution of different biotic taxa and ecosystems in Lapland.

--- to analyse the function of local subarctic ecosystems, where also man has exerted an influence. Particularly livelihoods depending on the natural ecosystems (reindeer-herding, fishing, hunting, berry-picking, etc.) and the changes caused by the human activities are included.

--- to function as a centre for glacial and periglacial research in geomorphology in this region where these forms are very frequent and varied and where strong annual variations are typical.

^x until August 1974: The Kevo Subarctic Research Station

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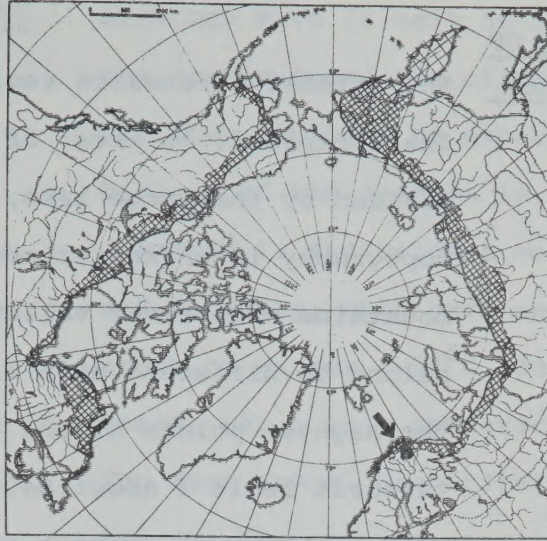
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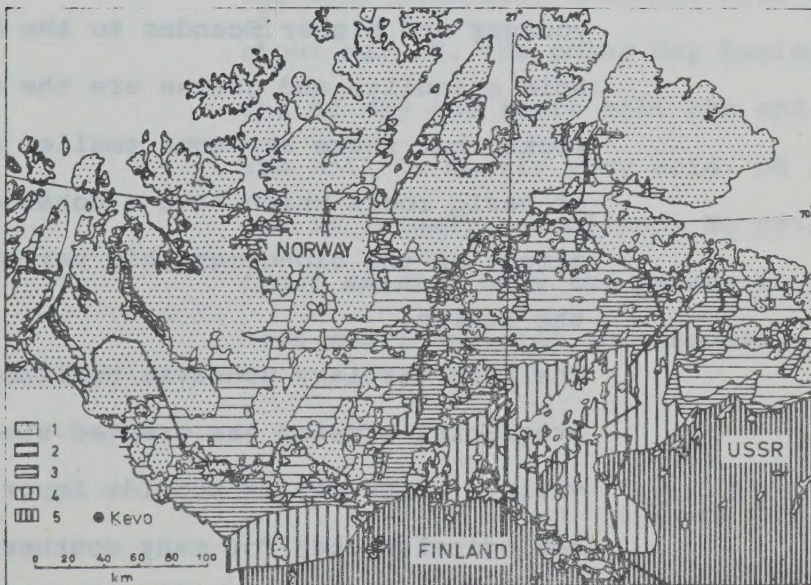
- to function as a local centre for cooperation between all the different institutes interested in the problems and areas concerned.
 - to cooperate in circumpolar Arctic and Subarctic research.
 - to serve as an authority in problems concerning the development of Lapland, particularly in problems of natural resources.
- These are always combined with the problem of conserving the environment.

SITUATION

Kevo is situated at $69^{\circ}45'N$ and $27^{\circ}00'E$ (Grid $27^{\circ}E$ 7741:500), 100 m a.s.l., in Finnish Lapland close to the Norwegian border at the lake of Kevojärvi in Utsjoki, the northernmost commune. The site is some 60 km north of the continuous pine forest line and may be termed a subarctic or forest tundra zone, a birch subzone of the boreal coniferous forests. The local situation: on a cape of the small lake, Kevojärvi, which is a widening of the river Utsjoki, close to the road from Ivalo to Utsjoki and Norway, but separated from it by a narrow neck of water, 300 m across.



The location of Inari Lapland (arrow) at the border of the subarctic and boreal zones. Cross-hatching = subarctic zone, dotted line = southern limit of the boreal zone. According to HUSTICH (1966).



Vegetation zones in northernmost Finland. 1 = barren fells, 2 = birch bushes and birch forests, 3 = birch forests and small groves of pines, 4 = pine forest, 5 = coniferous forest (pine and spruce). Redrawn from the Atlas of Finland, 1960.

GENERAL ASPECTS OF
THE RESEARCH AREA

The intensive research region comprises Inari Lapland, an area of 20,000 km², divided by the large lake, Inari. The topography is characterized by low mountains with river valleys, which often belong to different main biotic zones. The highest points of the area, the Pais-tunturit fells (about 640 m), are situated in the western part of Utsjoki. The elevation is mostly between 250 and 400 m and relative height 200-300 m.

Geologically, the whole area belongs to the Baltic Shield and is bordered by the younger and higher Scandes to the North. Acid granulite and gneiss are the dominant rocks, but there are some smaller areas of basic rocks which have a considerable effect on the bio-geographic variety of the region.

The late tertiary upheaval combined with preglacial erosion has created steep valleys whose cliffs provide important ecological niches for many southern and arctic plants in the area. One of the most important valleys of this type is the Kevo-joki gorge close to the station. This area has been made into the Kevo Nature Park.

CLIMATE AND SOIL

Although Kevo is only 50-100 km from the Arctic Ocean the climate is not as maritime as might be expected. This is because of the Scandes in the West (and NW). The coldest months, January and February, both have an average temperature of approx. -17°C . July, the warmest month, has a mean temperature of $+12^{\circ}\text{C}$. The mean annual precipitation is about 400 mm. The growing season is 110-120 days and the thermal sum varies in the vicinity of Kevo between 300 and 800 depending on elevation and annual variations.

The snow generally does not melt until about May 20. The polar day begins at the end of May and lasts till the end of July. The soil is mostly very acid, pH 3.5-4.5, and is largely podsolized. No real permafrost exists; only the palsas in the bogs have small isolated ice lenses.

GLACIAL ANDPERIGLACIAL FORMS

Most of the glaciofluvial matter has been deposited on the bottom of the precipitous river valleys as kame terraces, esker-like chains and deltas. Periglacial formations worthy of mention are rock cliffs and the talus cones frequently found at their feet. Many results of recent fluvial action, such as undercut bluffs and bars, can also be seen. In the fell region proper there are numerous meltwater drainage channels. These are sometimes found in isolation, sometimes in large groups. These phases of deglaciation can be perfectly reconstructed. In places there occur large areas of patterned ground, different types of solifluction lobes and boulder depressions. On the tops of the fells there are often tor formations. In the wide and strongly eroded areas between the fells can be seen the oldest glacial formations, e.g. rock drumlins, drumlins and other fluted moraine forms. In places where numerous layers of fine-grained sediments have been deposited, wind has created dunes and caused different deflation forms.

THE MAIN FEATURES
OF THE BIOGEOGRAPHY

Although the station is situated 60 km north of the main coniferous forest, there is an isolated pine forest round the station in the Utsjoki and Kevojoki valleys. In the north and above the 250 meter contour, the birch displaces the pine and most of the country round Kevo is birch (Betula tortuosa) forest while the areas above 300-350 m are low alpine heaths, treeless 'tundra' areas. Dwarf shrubs and vegetation rich in lichens and mosses are typical. Round the station, however, the topography is rather varied, and the vegetation includes luxuriant forests, bogs, streams, ponds, cliffs, meadows surrounding some Lapp farmhouses, etc.

The reindeer is one of the most important animals in the ecosystem here, particularly for the Lapp economy. Other large animals are rare (e.g. elk, wolverine, arctic fox; wolf has not been seen since 1960 and the bear is very rare in Inari). Foxes, hares, squirrels, voles and shrews are rather common. Typical birds in this region are the meadow pipit (Anthus pratensis), brambling (Fringilla monti-

fringilla), golden plover (Pluvialis apricaria), rough-legged buzzard (Buteo lagopus) and willow grouse (Lagopus lagopus), which is also a very important game bird.

Fluctuations in density are very characteristic of lemming populations, predatory birds (Buteo lagopus) as well as many invertebrates (e.g. Oporinia).

Very important fish species are the whitefish (Coregonus spp.) and different species of salmon and trout.

Human influence is not important as regards the large areas outside the small settled centres in the Tenojoki and Utsjoki river valleys. The half-domesticated reindeer has, however, strongly affected pasture and, in part, the pine forest line.

Further information of the Kevo research area is given in ' Reports from the Kevo Subarctic Research Station ', Vol 1 and 2.

STATION BUILDINGS

The station comprises an area of 280 ha and has 10 buildings comprising some 1700 m². There is accommodation for approx. 40 persons in addition to the permanent staff of five families.

The Institute has a number of substations:

- meteorological station organized by the Central Institute of Meteorology in Finland.
- seismological station of the Institute of Seismology.
- an observation point of Sodankylä Geophysical Institute (doing research on northern lights).
- an observation point and equipment of the Institute of Occupational Health.
- an observation point and equipment of the Hydrological Office of the National Board of Waters.

FACILITIES FOR
BIOLOGICAL AND
GEOGRAPHICAL WORK

In addition to the space required for the meteorological and geophysical equipment, there is laboratory space amounting to 400 m² and the following instruments:

- microscopes; balances; cameras; pH-meter;
- infra-red gas-analyzing laboratory with controlled light and temperature adjustments; sterile laboratory with UV-light; autoclave; deep freezes; refrigerators; ovens; incubators;
- light traps; Tullgren funnels; equipment for collecting and preserving botanical, zoological, geological and limnological material during field studies;
- soil auger; soil sieving machine with sieves; levelling equipment;
- conductivity meter; pressure membrane extractor;
- temperature recorder; precipitation gauge ; equipment for microclimatological observations; evaporation meters; automatic rain recorder; various electrically controlled thermometers; etc. ;
- 4 motorboats; 3 rowboats; a snow scooter; a minibus.

The Institute has a small library, which includes both Finnish publications on biological and geo-sciences and also publications specializing in northern studies. Attempts are being made to increase the library by means of exchange with foreign libraries and other institutions.

There is also a small herbarium, in which representative specimens of local vascular plants as well as some cryptogames are kept. The main collections of zoological and botanical specimens are kept in the respective collections of Turku University.

RESEARCH

- The main object of research has been adaptation to thermal and light conditions.
- Within the framework of the IBP studies have been made of the following: growth and productivity rates, energy flow in lichens, gradient analysis of vegetation and the relation between climatic variables and primary productivity.
- Among consumer studies the main topic has been secondary production and herbivory upon Betula tortuosa.
- Special attention has been given to explaining density fluctuations typical of subarctic conditions, especially in caterpillars of Oporinia autumnata and mass outbreaks of small mammals, especially Lemmus lemmus.
- In addition terrestrial invertebrates, their occurrence and ecology have been studied: especially spiders, beetles, butterflies and moths, and density and ecology in soil fauna.

- Geomorphological studies by the Department of Geography have mainly concentrated on altiplanation, development of tor formations and solifluction, patterned ground forms and palsas, eolian processes and sand dunes, deglaciation, fluvial processes and composition of drainage basins.
- Soil analysis has been started in order to estimate the nutrient cycle of the most important chemical properties.
- Mapping of flora, the primary programme at Kevo, especially vascular plants and mosses, lichens and fungi.
- Birch (Betula tortuosa) genetical and cytological studies, partly a project of SITRA, in cooperation with Forestry Board and the Finnish Forest Research Institute.
- Nitrogen supply problem has been studied in lichens and free blue-green algae partly as a project of the IBP.
- Cultivation and general ecology of the cloudberry (Rubus chamaemorus).

- The fish population studies of rivers are partly organized by the Finnish Game and Fishery Research Institute.
- Special aspects of the moulting periods in subarctic passerine birds.
- Herbivore action by reindeer upon the birch has been studied and the mortality of reindeer calves, too.
- Changes in the environment caused by human activities are studied partly within the framework of the MAB.
- Studies of the renewal of natural resources.
- Socio-anthropological studies of the changes in reindeer-herding from the traditional system to modern cooperatives of reindeer owners.
- Aspects of Lapp culture important for museums.

The above-mentioned studies have been published to a large extent in our own series: ' Reports from the Kevo Subarctic Research Station ' , published approximately once a year. Up to the present (1974) 11 volumes have been published. See appendix!

FINANCING

The research work at the Institute is financially supported by the state councils, University of Turku, different foundations and private donations.

VISITORS

The station is open all the year round. The accomodation is very modest, but the possibilities for pursuing different types of scientific work are rather good.

HOW TO GET TO KEVO

There is a daily flight from Helsinki and Turku (via Oulu and Rovaniemi) to Ivalo, and there is a bus connection (150 km) to Kevo.

By train you can travel to Rovaniemi, where you must continue by bus to Kevo (450 km) or by air to Ivalo.

Access to the station in summer is by boat across Kevojärvi (300 m).

PERSONNEL TO
BE CONTACTED

- The head of the Institute, Dr. Paavo Kallio (Professor of Botany)
- Station manager Matti Sulkinoja, M.A.
- Amanuensis Saini Heino, M.A. (in charge of collections, library, exchange of periodicals).
- Technical personnel at the Meteorological Station, Mr. and Mrs. Ralf Karlström.

ADDRESSES

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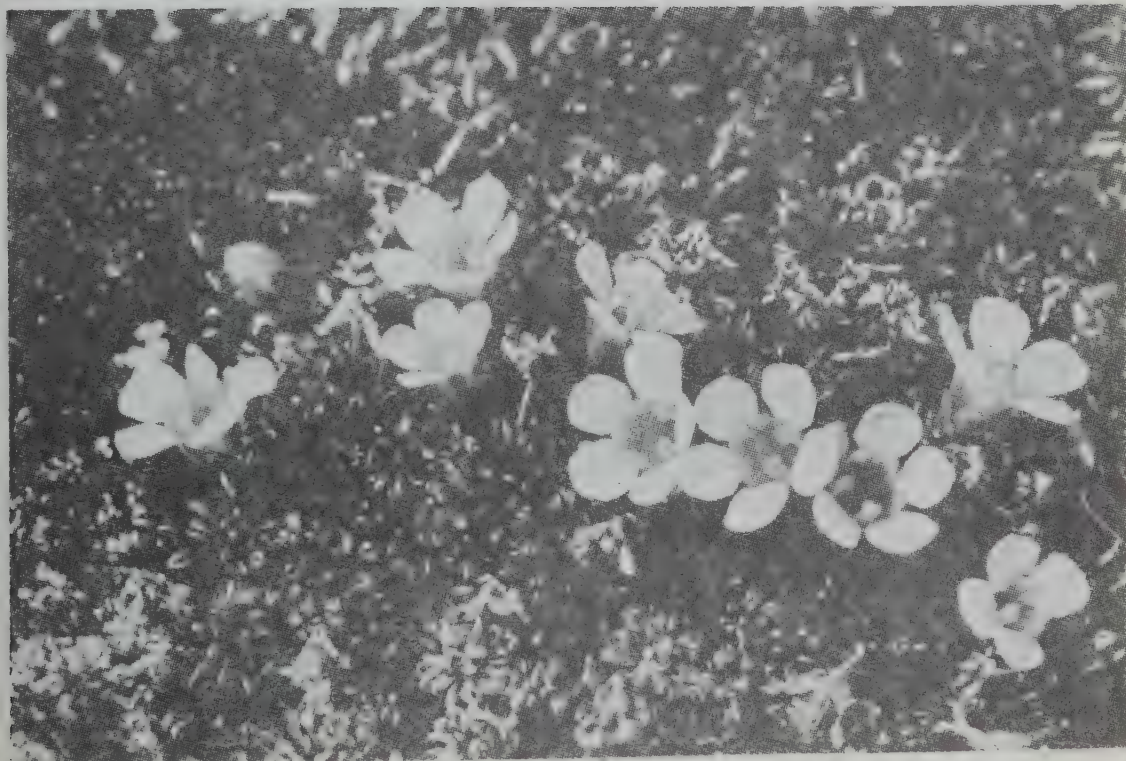
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(October - May) :

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Diapensia lapponica

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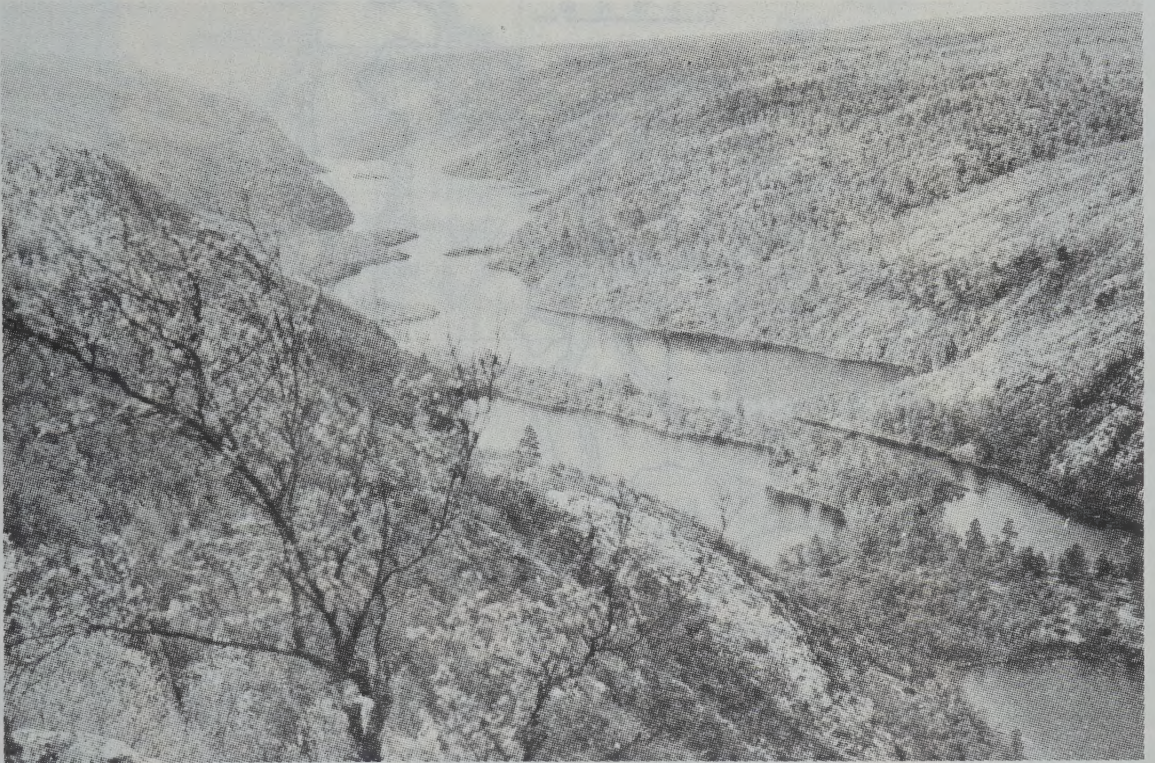
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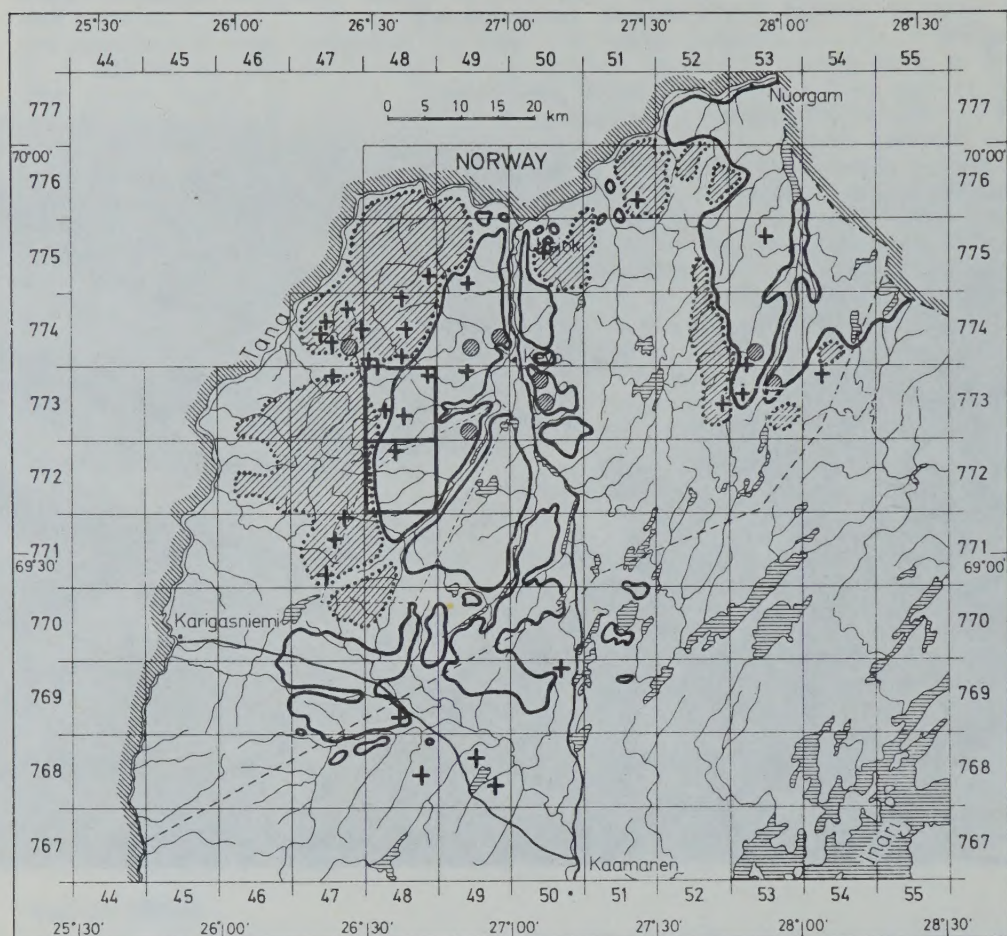
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The Kevojoki valley is one of the most exciting views along the path through the Kevo Nature Park.



The Oporinia damage areas from 1965 - 1966 in Utsjoki. The damage areas are drawn by thick continuous lines. Diagonal lines show recent treeless areas, which are partly of secondary origin. Crosses indicate older birch damages. Circles indicate the sites of fences. According to KALLIO and LEHTONEN (1973).

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Topographic map of the surroundings of Kevo. Countour intervals 20 m. On the east side of Kevojärvi runs the highway from Rovaniemi via Inari to Norway.